and to being rather easily disturbed in its new quarters, this goldfish ate eleven larvæ only, in three hours; but the next day twenty were devoured in one hour; and as the fish became more at home the 'wigglers' disappeared in short order whenever they were dropped into the water. On one occasion twenty were eaten in one minute, and forty-eight within five minutes. This experiment was frequently repeated, and to see if this partiality for insect food was a characteristic of those goldfish only which were indigenous to this locality, I experimented with some said to have been reared in carp-ponds near Baltimore, Maryland. The result was the same, though the appetite for mosquitoes was even more marked with the Baltimore fish than with the others. This was probably due to the fact that they had been in an aquarium for a long time before I secured them, and had been deprived of this natural food. I also tried the experiment of feeding commercially prepared 'goldfish food' and mosquito larvæ at the same time, and found that in such a case the goldfish invariably preferred the larvæ.

It is not as generally realized as it should be that goldfish will thrive in our natural northern waters. In my experience they can easily be bred in any sheltered pond where the water is warm and not fed by too many cold springs, and form any years they have been breeding naturally in many small ponds in the vicinity of Cambridge, Massachusetts.

When it is once understood that these fish are useful as well as ornamental and comparatively hardy, it is to be hoped that they will be introduced into many small bodies of water where mosquitoes are likely to breed, and thus be employed as a remedy for mosquitoes sometimes preferable to kerosene.

William Lyman Underwood.
Massachusetts Institute of Technology, November 27, 1901.

NOTES ON INORGANIC CHEMISTRY.

NEW WORK ON RADIUM.

A new series of experiments has been carried out by Berthelot on radium, with reference to its chemical action, as shown upon several compounds. The radium used was enclosed in one sealed glass tube within another, and in some of the experiments within a third, so that its influence was much weakened and some of the active rays were altogether cut off. The action took place in the dark and was exceedingly slow. Iodin pentoxid was decomposed by the radium rays just as by light, and the same was true of nitric acid. Since both of these reactions are endothermic, the rays must furnish chemical energy. The change of rhombic sulfur into the insoluble variety, an exothermic reaction which is effected by light, was not affected by the radium rays. The rays have no influence upon acetylene, which is very sensitive to the action of the electric current but is unaffected by light. Oxalic acid also was not changed, though it is readily oxidized even in diffused light. The glass tubes in which the radium was contained were blackened, owing probably to a reduction of the lead. A purple color was also noticed in the glass near the blackened portions, which was attributed to an oxidation of the manganese present.

In this connection it may be noted that the existence of the radio-active lead, recently described by Hofmann and Strauss, is denied by Giesel. He considers it to be a mixture of lead with a little radium. He confirms, however, the observation of several workers, that water can be rendered strongly radio-active by radium. He enclosed half a gram of radium-barium bromid in one arm of a sealed U-tube, distilled the water of crystallization over into the other arm, and then sealed it off by fusion. Both the water and the air in the sealed tube were strongly active, more so indeed than the original salt. That this was not due to minute particles of radium which had been driven over mechanically was proved by the fact that the radio-activity disappeared within a few days.

AMMONIA ON METALS.

In endeavoring some years since to find a metal which would withstand the action of ammonia gas at high temperatures, G. T. Beilby noted the fact that every metal tested soon become brittle and spongy. In conjunction with G. G. Henderson, Mr. Beilby has now investigated the phenomenon more closely and the results are published in the last number of the *Journal of the Chemical Society* (London). It has

long been known that ammonia is rapidly decomposed into nitrogen and hydrogen by the action of red-hot iron, but the effect upon the iron has attracted less attention. The authors find that whatever the metal used, it becomes changed in its appearance and very brittle. With some metals, as iron, the action is very rapid, with others slower, but even gold and platinum cannot resist this action of ammonia. Under the microscope the metal gives evidence of having been fused or semi-fused, and of bubbles of gas having escaped through the fused metal. The authors conclude that under the influence of the ammonia a nitrid of the metal has been formed, which is stable only within narrow limits of temperature, and which is fusible at the temperature of its formation. At slightly higher temperatures than that of its formation, it is decomposed into the metal and the escaping nitrogen gives the peculiar appearance to the metal. Pure iron was found to be rendered hard and brittle by the absorption of small quantities of nitrogen and a rod of charcoal iron was made so hard that it could be used as a drill. The thought naturally suggests itself that the presence of nitrogen may play some part in the manufacture of cement steel. The results of this investigation make it clear that there is no metal of which pipes can be made for the conveyance of ammonia at high temperatures, and that porcelain is the only available material for this purpose.

FITTICA'S LATEST TRANSMUTATION.

PROFESSOR FITTICA has been heard from again, and this time he claims to convert boron into silicon, or rather he considers boron to be an oxid of silicon, contaminated perhaps with carbon. By heating boron in a silver dish with sodium or potassium or their hydroxids, he obtains a dark, oily mass, from which carbon can be isolated by acidifying. The chief constituent of this mass, however, is silicic acid, as shown by familiar tests. The alkali was proved to be originally free from silicic acid, but no evidence is presented that the boron used did not contain silicon. Other methods for effecting this conversion were successful, but all seem to be open to the same criticism.

J. L. H.

CIRCULAR OF INFORMATION OF THE NATIONAL BUREAU OF STANDARDS, NO. 1.

ANNOUNCEMENT OF ORGANIZATION.

BY an act of Congress approved March 3, 1901, the Office of Standard Weights and Measures of the Treasury Department was, on July 1, 1901, superseded by the National Bureau of Standards, the functions of which are as follows: The custody of the standards; the comparison of the standards used in scientific investigations, engineering, manufacturing, commerce, and educational institutions with the standards adopted or recognized by the Government; the construction, when necessary, of standards, their multiples and subdivisions; the testing and calibration of standard measuring apparatus; the solution of problems which arise in connection with standards; the determination of physical constants and the properties of materials, when such data are of great importance to scientific or manufacturing interests and are not to be obtained of sufficient accuracy elsewhere.

The Bureau is authorized to exercise its functions for the Government of the United States, for any State or municipal government in the United States, or for any scientific society, educational institution, firm, corporation, or individual within the United States engaged in manufacturing or other pursuit requiring the use of standards or standard measuring instruments.

For all comparisons, calibrations, tests, or investigations, except those performed for the Government of the United States or State governments, a reasonable fee will be charged. Provision is also made for the purchase of a site and the erection of a suitable laboratory, its equipment with the most improved facilities and the personnel necessary for the organization of the Bureau.

A suitable site has been selected in Washington in a locality free from mechanical and electrical disturbances, and yet easy of access. Plans are being prepared for a physical laboratory which will be equipped with apparatus and conveniences for carrying on investigations, and for testing standards and measuring instruments of all kinds. Also a somewhat similar building, to be known as a mechanical labora-